

IDENTIFICATION OF ARCHAEOLOGICAL AND ETHNOLOGICAL SPECIMENS OF FIBRE-PLANT MATERIAL USED BY THE MAORI

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Abstract. Criteria and a key are given for the identification of thirteen fibre-plants found in New Zealand archaeological excavations, random collections from cave sites and rock shelters, and/or in the Ethnology collections of the Auckland Institute and Museum: *Astelia*, *Bulbinella gibbsii* var. *balanifera*, *Cordyline*, *Cortaderia toetoe*, *Dracophyllum*, *Eleocharis sphacelata*, *Freycinetia banksii*, *Hierochloa redolens*, *Phormium*, *Rhopalostylis sapida*, *Desmoschoenus spiralis*, *Typha orientalis* and *Uncinia rubra*.

Before the arrival of European settlers in New Zealand several indigenous fibre-plants, in addition to *Phormium*, were used by the Maori in making clothing, mats, baskets and cordage. There is no complete list of all the plants used by the Maori for domestic and economic purposes; there are, however, numerous references in the writings of Colenso, Best, Hamilton, Buck and other authors.

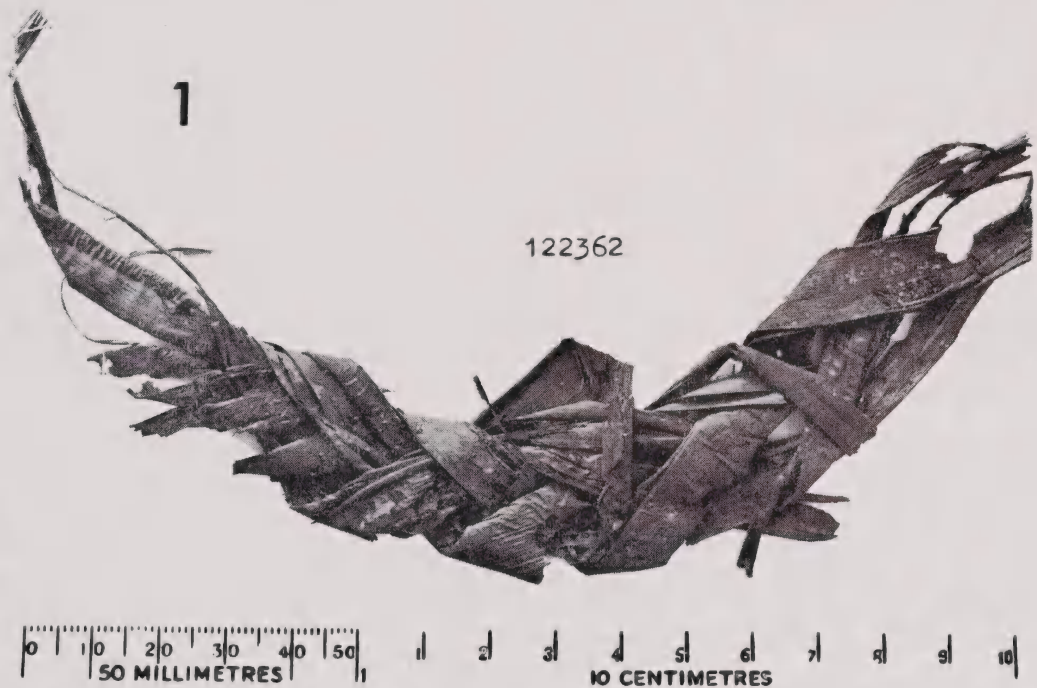


Fig. 1. *Bulbinella gibbsii* var. *balanifera*, Fiordland; remains of plaited leaves, Herb. AK 122362.

Leaves of the genus *Bulbinella* (Fig.1), not mentioned by any of the foregoing authors, have been identified recently in a large collection of archaeological material from Fiordland, sent for identification by Mr Peter Coutts, Myer Research Fellow in Prehistory, Otago University. The fragments of plaited *Bulbinella* suggest that the Maori may have used any available plant for immediate and temporary purposes.

Since finding the *Bulbinella*, plant fragments collected from North Island cave sites and rock shelters and preserved in the Auckland Institute and Museum Ethnology Department have been examined. These collections are from the Poor Knights Islands, Whangaroa, Anawhata, Piha, Whatipu and Lake Taupo. Maori baskets, belts, cloaks, cordage, kilts, kites, mats, oven bands, pack straps, poi rain capes and sandals in the Ethnology Department were also examined, and in most cases the plant materials used were identified. The genus and, where possible, the species were determined from the structure, appearance and texture of prepared or unprepared leaf fragments and fibre, without the usual aids of flowers and fruit. Comparisons were made with both fresh and dried plant specimens and all material was examined under a microscope (20 X).

As a possible aid to future workers the notes prepared when determining the plant material have been expanded and set out below. The plants are discussed in the following sequence:—

1. Those found in archaeological excavations, and collections from cave sites and rock shelters.
2. Those plants which have been used in the manufacture of articles preserved in the Ethnology Department, but not, so far, found in archaeological material.
3. Those plants mentioned in the literature as having been used by the Maori but, as yet, not found in any of the material available.

Apart from the few figures inserted in the text, all plates are arranged firstly so that archaeological specimens precede ethnological material and secondly so that all rope is together, all baskets are together, and so on. It is hoped that this will facilitate comparison and identification of the fibre-plants used in newly-found material.

FIBRE-PLANTS IN ARCHAEOLOGICAL COLLECTIONS

In this section fragments of plant material found in archaeological excavations, cave sites and rock shelters are identified. Where possible, references to literature which mentions the use of similar Maori fibre-plants are given, together with lists of selected Maori artifacts made from the same material and held in the Ethnology collections of the Auckland Institute and Museum.

Phormium (Agavaceae) New Zealand flax

The genus of two species is endemic to New Zealand and Norfolk Island. The leaves are described by Cheeseman (1925, p. 320) as, "all radical, long, linear-ensiform, equitant and distichous, exceedingly tough and coriaceous."

The leaves of *Phormium tenax* J. R. & G. Forst, provided the Maori with suitable material for making clothing, mats, baskets and cordage. Mats, belts, baskets and ropes were plaited from strips of the green leaf; ropes, lashings and fishing lines were plaited from the dressed fibre, which was also woven into cloaks. It is likely that the leaves of *P. cookianum* Le Jolis were also used by the Maori but the fibre was considered inferior and was not used to the same extent as *P. tenax*. No specific identification of the two plants has been made here.

Selected references, from the literature, to the Maori uses of *Phormium* are:—

- aprons — Hamilton 1896-1901, p.289; Best 1899, p.645; Buck 1926a, p.47; Duff 1943, p.212; Dodge 1941, p.9; Buck 1949, p.159; Phillipps 1966, p.64, fig.58; Mead 1969, p.122, fig.47.
- baskets — Colenso 1869a, p.36; Hamilton 1896-1901, p. 295; Best 1899, p.649, 1924c, p.205, fig. 94; Buck 1923, p.732, 1949, p.154, pl.7.
- belts — Hamilton 1896-1901, p.291; Best 1899, p.647, 1924b, p.520, 1924c, p.205, fig.92; Buck 1924, p.346, 1949 p.175; Ryden 1963, p.89, fig. 42; Mead 1969, p.66 fig.18.
- cloaks — Colenso 1869a, p. 33, 1869b, p.14; Hamilton 1896-1901, p.283-289, pl.38; Best 1899, p.639, 1924b, p.514; Buck 1911, p.77, 1926a, p.51-58, pl.23, 1949, p.169, pl.12; Roth 1923, p.40; Dodge 1941, p.10-14; Ryden 1963, p.80, pl.29; Mead 1969, many references and illustrations.
- fire-fans — Buck 1924, p. 353, pl.37, 1949, p.156.
- fishing lines — Colenso 1869a, p.35; Best 1924c, p.257, fig.120; Buck 1949, p.216.
- fishing nets — Best 1903, p.72-81, 1924c, p.243-251; Buck 1926b, p.597-646 ill.
- fly traps — Buck 1924, p.355, pl.37.
- food baskets — Hamilton 1896-1901, p.295; Buck 1923, p.726-732, pls.78,82; Best 1924a, p.419.
- kilts — Hamilton 1896-1901, p.290; Best 1899, p.642; Buck 1911, p.88-90; 1926a, p.47-51, pl. 15, 1949, p.175; Roth 1923, p.48; Dodge 1941, p.9, pl. 3; Mead 1969, pl.119-120, fig.46.
- mats — Colenso 1869a, p.35, 1869b, p.14; Hamilton 1896-1901, p.297; Best 1899, p.655, 1924b, p.525; Buck 1923, p.716-725, pl.81, 1949, p.149.
- oven bands — Buck 1924, p.350-353, pl.36.
- pack straps — Hamilton 1896-1901, p.291; Buck 1923, p.738-739, pl.82; Best 1924a, p.404, ill.
- rain capes — Colenso 1869b, p.14; Hamilton 1896-1901, p.287; Best 1899, p. 641, 1924c, p.201, fig.89; Roth 1923, p.46; Buck 1926a, p.136, pls.19,38, 1949, p.166; Mead 1969, p.117-119, fig.25a.
- rope and cordage — Best 1924b, p.531 ill., 1924c, p.208 fig. 96.
- sails — Buck 1924, p.361, 1949, p.156.
- sandals — Hamilton 1896-1901, p.293; Best 1899, p.653; 1924b, p.522; Buck 1924, p.357, 1949, p.156; Mead 1969, p.123.

Selected reference specimens in the Ethnology collections of the Auckland Institute and Museum are listed below. In this and subsequent lists, "Eth." indicates the accession number in the Ethnology collection, dimensions in cm are maxima and these are followed by locality (where known) and date of accession.

- Eth. 820 apron, triangular, woven, with black twisted thrums; 65x69x58cm; illustrated in Mead 1969, fig.47a (not 47b, as stated); 1901.
- Eth. 740 basket "for straining the juice of tutu berries" made of leaf strips 4mm wide; 19x21cm; 1899. (Fig.57).
- Eth. 6874 basket, closely plaited, of leaf strips 5mm wide; 43x32cm; 1925. (Fig.63).
- Eth. 13875.1 basket, openly plaited, of narrow leaf strips 2mm wide; 57x28cm; 1930. (Fig.60).
- Eth. 7678 basket "for cooking food in hot springs", openly plaited, of leaf strips 6mm wide; 30x22cm; loops at top for rope: Ohinemutu, 1920. (Fig.53).

- Eth. 7698 basket, plaited in twilled design of natural and black leaf strips 4-8mm wide; 62x44cm; 1917.
- Eth. 672 belt, folded, made of natural and black leaf strips 2mm wide; 128x10cm; 1875.
- Eth. 14650 belt, folded, of natural coloured leaf strips 3mm wide; 141x10cm; 1925.
- Eth. 287 cloak, finely woven, with three taniko borders; 158cm wide and 132cm deep; illustrated in Mead 1969, fig.32b; 1887.
- Eth. 10637 fire fan, plaited of leaf strips 8mm wide; 22x15cm with loop at one corner; illustrated in Buck 1924, pl.37, fig.1; 1927.
- Eth. 1431? fishing line of very fine two-ply twisted fibre, 1mm diameter; large hank, golden brown; (probably Grey collection).
- Eth. 38819 fishing net, conical, knotted, of leaf strips 2mm wide; 85cm long, 60cm wide at base, tapering to a point; Anawhata, 1968. (Fig.23).
- Eth. 4666 net, knotted, of leaf strips 3mm wide on mussel dredge; 1930.
- Eth. 785 food basket, closely plaited of leaf strips 4mm wide; c.13cm square and 3cm deep; Kaipara, 1899. (Fig.51).
- Eth. 292 kilt, 133cm wide and 78cm deep, with short tags of curled leaf scraped at intervals; illustrated in Mead 1969, fig. 27b; 1887.
- Eth. 825 kilt, 94cm wide and 56cm deep, with long tags of curled leaf scraped at long intervals; illustrated in Mead 1969, fig.27a; 1901.
- Eth. 6885 mat, plaited, of leaf strips 5mm wide; 259x153cm; Gisborne, 1925.
- Eth. 3868 oven band, twisted, of leaf strips 3mm wide made into a thick 3-ply plait tapering at both ends; 120cm long and 8cm wide at centre; similar to illustration in Buck 1924, pl.36, fig.3; 1924.
- Eth. 5489 oven band, plaited, of leaf strips 1cm wide, flat; 138x17cm; Kaipara, 1911.
- Eth. 3866 oven mat, "for covering food in cooking oven. Tags at four corners for lifting off"; plaited, of leaf strips 7mm wide; 90x49cm; Taranaki, 1924.
- Eth. 1053 pack strap of two plaited bands made of leaf strips 4mm wide 288cm long; joined at centre by band 13x3.4cm; 1927.
- Eth. 314 rain cape, 100cm wide and 77cm deep, with long folded tags of fibre 20-40cm long; illustrated in Mead 1969, fig.24a as "kahu toi"; 1887.
- Eth. 5569 rain cape, 113cm wide and 76cm deep, with wide folded tags of leaf strips, 16x1cm; illustrated in Mead 1969, fig.25a; 1912.
- Eth. 1048 rope of roughly prepared fibre; flat plait 8mm wide; large hank; Taranaki, 1927.
- Eth. 1075 sandal, plaited of leaf strips 1cm wide; 28x10cm; 1927. (Fig.45).

Maori preparation of *Phormium* fibre

The midrib and margins of the leaf were torn off and discarded, then with the aid of the sharp edge of a mussel shell the lower surface of the leaf was peeled off leaving the long strip of the upper surface of the leaf containing the best fibre. This strip was scraped to remove the epidermis and tissue from the fibre which was then soaked in water for several days; beaten between stones; scraped again and resoaked, then spread on the ground to bleach and dry; beaten again to remove any adhering tissue, and finally worked and twisted for the purpose required. For softness and colour, fibre hand-dressed by the Maori far surpassed any machine-dressed *Phormium* fibre. The painstaking preparation by the Maori is described by several authors.

Some terms used in describing the Maori method of preparing *Phormium* fibre are as follows:

Stripping. The lower surface of the leaf was peeled from the upper surface with the edge of a shell or piece of obsidian. (This should not be confused with the tearing into strips of the green leaf for plaiting into baskets and mats.)

Scraping. After stripping, the remaining upper surface was scraped with a shell to remove adhering epidermis and tissue.

Dressed fibre. After stripping, scraping, washing, beating and bleaching, the fibre was twisted by rubbing between the hands or against the thigh and was ready for weaving into cloaks or plaiting into fine cordage.

European preparation of *Phormium* fibre

Some terms used in European mechanical preparation of *Phormium* fibre are given for comparison.

Stripping. The first process, when the fibre is extracted from the green leaf by a stripping machine.

Scutching. After stripping, washing and bleaching, any remaining extraneous matter is removed from the fibre by beating in a scutching machine.

Dressed fibre. The finished fibre which is ready for making into rope and cordage of various sizes.

Characters for the identification of *Phormium* leaves in archaeological and ethnological material are:

Leaves long, flat, leathery, sword-shaped, 1-4m long, 5-13cm wide; folded and coalescent at the base; light brown, occasionally retaining some green colouring; midrib keeled, coloured red or yellow; margins ribbed, coloured red, yellow or black; veins numerous, even, parallel. (In *P. cookianum* midrib and margins not usually coloured; leaf paler green.)

Upper surface of leaf lustrous, glabrous, papery, pale yellowish-brown; midrib sunken; veins parallel, fairly evenly spaced, not very apparent; margins ribbed, coloured red, yellow or black. (Margins not usually coloured in *P. cookianum*.)

Lower surface of leaf dull, glabrous, furrowed, darker brown than upper surface; midrib prominent, keeled, coloured red or yellow; veins parallel, fairly evenly spaced, prominent; margins ribbed, coloured red, yellow or black. (Margins not usually coloured in *P. cookianum*.)

Fibre. In remains of unprepared or lightly scraped leaf, fibre bundles compressed, flat, pliable, dull, light to dark brown, c. 0.3mm - 0.4mm wide.

(Fibre bundles measured occur in leaves in compressed bands associated with vascular bundles and consist of strands of numerous thin elongated cells bound together. Single or ultimate fibres not measured.)

In well dressed fibre (scraped, beaten, washed and bleached), bundles round, pliable, soft, lustrous, with occasional pieces of shiny epidermis adhering; c. 0.05mm - 0.1mm wide; cream or golden coloured in fine cloaks.

Selected archaeological reference fragments from cave sites (north to south) held in the Herbarium of the Auckland Institute and Museum are listed below. In this and subsequent lists, "Herb. AK" indicates the number of the voucher specimen in the Herbarium; other information given includes locality, collector, date of collection and assumed use of specimen.

Herb. AK 126559 (Eth. 21172.1) Whangaroa, V. Fisher, 1934; fragments of plaited rope.

Herb. AK 126044 (Eth. 23883.2) Anawhata, F. Mappin & A. T. Pycroft, 1928; bundle of matting plaited in strips 3 mm wide.

- Herb. AK 126045 (Eth. 23889) same locality, collector and date; remains of cape. (Fig. 28).
- Herb. AK 126043 (Eth. 23883) same locality, collector and date; remains of net. (Fig. 25).
- Herb. AK 123896 (Eth. 31112) Lion rock, Piha, C. Trevarthen, 1949; fragments of woven cloak.
- Herb. AK 125308 (Eth. 19777.1) between Piha and Karekare, F. Mappin, 1933; remains of knotted leaf.
- Herb. AK 125617 (Eth. 19776.2) same locality, collector and date; belt, 97 cm long, 8 cm wide, plaited in strips 3 mm wide. (Fig. 36).
- Herb. AK 126132 (Eth. 43172.2) Piha, Errol Willis, 1959(?); large fragment of basket with two handles, plaited in strips 5 mm wide.
- Herb. AK 126251 (Eth. 24672) Piha, W. E. Browne, 1939(?); fragment of woven cloak.
- Herb. AK. 126259 (Eth. 17107.1) Paratutai, Whatipu, J. Donald and G. Fairfield, 1931; pieces of plaited rope, c. 7 mm wide.
- Herb. AK 125874 (Eth. 34802.1) Motutaiko I., Lake Taupo, T. Hosking, 1956; pieces of woven cloak. (Fig. 27).
- Herb. AK 125875 (Eth. 34802.2) same locality, collector and date; thick twist of fibre, 1 cm diameter.
- Herb. AK 126255 (Eth. 35823) Lake Taupo, W. H. Boucher, 1957; small basket "for holding kokowai", 15 x 9.5 cm, close plait of strips 3 mm wide. (Fig. 42).
- Herb. AK 126249 (Eth. 35832) same locality, collector, and date; finely woven bag, 30 x 24 cm. (Fig. 44).
- Herb. AK 126257 (Eth. 35831.4) same locality, collector and date; long rope 160 cm, 2 cm diam.
- Herb. AK 126588 (Eth. 35829) same locality, collector and date; plaited bag, 45 cm long, 10 cm wide at centre, with knotted cord 43 cm long attached at each end; "used for expressing oil from titoki and other berries by a twisting process — tapers each end to a stout plaited cord"; leaf strips 5 mm wide. (Fig. 32).
- Herb. AK 126584 (Eth. 35824) same locality, collector and date; twilled basket 34 x 24 cm, of plaited strips 4 mm wide.
- Herb. AK. 126585 (Eth. 35841) same locality, collector and date; remains of large basket, coarsely plaited in strips 8 mm wide.
- Herb. AK 122363 Fiordland, P. J. F. Coutts, 1969; remains of plaited rope, 8-10 mm wide, made of strips of unscraped leaf.
- Herb. AK 122060 same locality, collector and date; remains of plaited rope, 5-10 mm wide, of scraped leaf. (Fig. 20).
- Herb. AK 126108 same locality, collector and date; fragments of plaited belt. (Fig. 14).
- Herb. AK 121854 same locality, collector and date; fragment of fine plaited material of leaf made of strips of unscraped leaf.
- Herb. AK 121859 same locality, collector and date; fragments of knotted net. (Fig. 24).
- Herb. AK 122114 same locality, collector and date; remains of knotted leaf. (Fig. 10).
- Herb. AK 121857 same locality, collector and date; stripped midribs and margins of leaves.

The main diagnostic characters of *Phormium* leaf in the material examined are the shiny epidermis, the coloured keeled midrib on the lower surface, the coloured margins and the even veins. The fibre in unprepared leaf is in flattened bands and the dressed fibre is very pliable and soft with the separate fibres very fine round and lustrous.

Cordyline (Agavaceae) ti or cabbage tree

Five indigenous species are keyed and described by Moore and Edgar in the latest treatment of the genus in *Flora of New Zealand Vol. 2*, (1970, p. 47), and the adventive species, *C. terminalis*, is mentioned. The leaves of *Cordyline* were described by Cheeseman (1925, p. 309):— "crowded at the top of the stem or

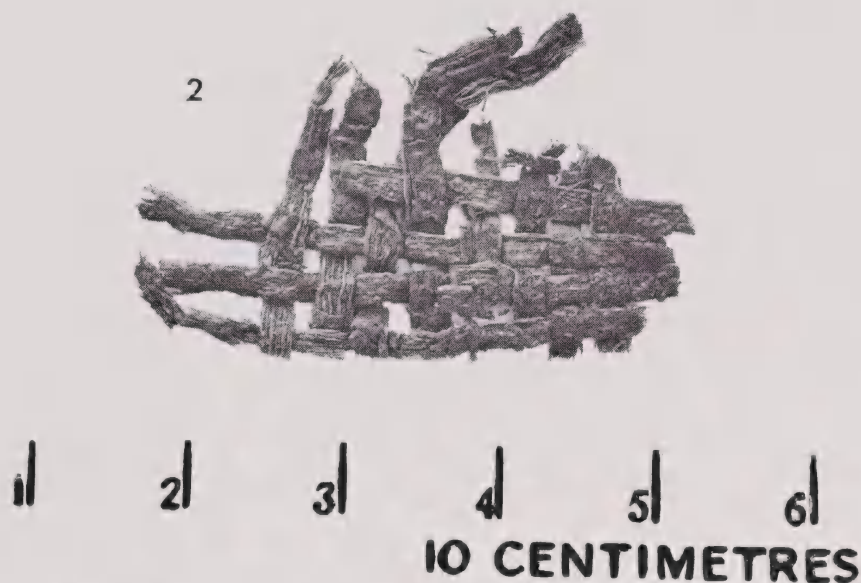


Fig. 2. *Phormium* sp., Fiordland; plaited fragment, Herb. AK 121854.

its branches, more rarely alternate along the stem, sessile or petioled, very long, coriaceous; veins parallel, more or less oblique to the midrib."

The Maori uses of *Cordyline* cited in the literature are:—

- baskets — Colenso 1869a, p. 36; Hamilton 1897, p. 295; Best, 1903, p. 57, 1924a, p. 430, illustrated p. 431, 1942b, p. 525; Buck 1923, p. 708; Phillipps 1966, p. 146.
- bird snares — Best 1924b, p. 459, 1924c, p. 182; Buck 1949, p. 93.
- cordage — Colenso 1869b, p. 14; Buck 1923, p. 708, 1949, p. 125; Best 1924b, p. 531.
- rain capes — Colenso 1869a, p. 33, 1869b, p. 14; Hamilton 1897, p. 281; Buck 1911, p. 87, 1923, p. 708, 1926a, p. 51, pl. 16, 1949 p. 167; Best 1924b, p. 518, 1924c, p. 201, fig. 89; Dodge 1941, p. 9, pl. 2; Ryden 1963, pp. 83-84, figs. 33,34; Phillipps 1966, p. 64; Mead 1969, pp. 62,117.
- sandals — Hamilton 1897, p. 294, 1896-1901, p. 175, pl. 9; Buck 1923, p. 708, 1924, p. 357; Best 1924b, p. 522; Mead 1969, p. 123.
- thatching — Colenso 1869a, p. 34; Best 1924c, p. 299.

Selected reference specimens in the Ethnology collections of the Auckland Institute and Museum are:—

- Eth. 3865 basket, plaited, of leaf strips 13 mm wide; 51 x 27 cm; 1924. (Fig. 62).
- Eth. 7696 basket, plaited, of leaf strips 4mm wide; 40 x 32 cm; with *Phormium* handles; 1917.
- Eth. 8299 basket, plaited, of leaf strips 2mm wide in twilled design; 52 x 27 cm; with *Phormium* handles; 1924. (Fig. 61).
- Eth. 18107 basket, plaited, of leaf strips 5 mm wide; 35.5 x 24 cm; dyed; 1932.
- Eth. 3867 food basket, plaited, of leaf strips 15 mm wide; c. 23 cm square, 6 cm deep; 1924. (Fig. 50.)
- Eth. 775 rain cape of *C. indivisa* fibre; 80 x 92cm; with long, folded, leaf tags; illustrated by Mead 1969, fig. 44b, as "timu"; 1899.
- Eth. 5252 rain cape of *Cordyline* fibre; 90 x 120cm, with long folded tags of fibre; illustrated by Mead 1969, fig. 45a, as "pota"; 1910.

Eth. 1083 rain cape of *C. indivisa* fibre; 85 cm x 102 cm; with long folded tags of fibre; illustrated by Buck 1926a, pl. 16, Maketu, Bay of Plenty, 1927.

Eth. 20640 rain cape of *C. indivisa* fibre; 75 x 100 cm; with long, folded tags of fibre; illustrated by Mead 1969, fig. 62; Rotorua, 1934.

Eth. 6180 sandals with soles of *Cordyline* leaf strips 1 cm wide; 32 x 13 cm; with *Phormium* ties; West Coast, South Island, 1918. (Fig. 46).

Maori preparation of Cordyline

Cordyline fibre was twisted into cordage and also used in weaving rain capes (Fig. 3). In the Maori preparation of fibre the midribs were first taken out and the leaves were softened by beating (Best, 1898, p.643). In another method the leaves were softened in a steam oven, then soaked in water and the remaining fibre was shaken out and scraped, then twisted into hanks ready to be woven (Buck 1911, p. 87). When making rain capes from *C. indivisa* the Maori cut only enough green leaves for one day's weaving as the fibre could not be separated from the vegetable tissue when the leaves dried (Best 1899, p. 643; Hamilton 1896-1901, p. 281).



Fig. 3. *Cordyline* sp., Taupo; remains of rain cape, Eth. 35842.

Cordyline australis, abundant throughout New Zealand, and *C. indivisa*, common in subalpine areas of the North Island and west coast of the South Island, were the species most used by the Maori.

Characters for the identification of *Cordyline* leaves in archaeological and ethnological material are:—

Cordyline australis (Forst.f.) Endl. ti or cabbage tree

Leaves long and narrow, flat, leathery, sword-shaped, 30-100 cm long, 3-6 cm wide; contracted above a broad sheathing base; light to dark brown; midrib indistinct; margins not coloured; veins fine and parallel.

Upper surface of leaf slightly lustrous, glabrous, papery, light to dark brown; midrib not apparent; veins parallel, unevenly spaced and of uneven thickness; margins ribbed, not coloured.

Lower surface of leaf slightly lustrous, glabrous, papery, pale to dark brown; midrib apparent, rounded, sometimes yellowish; veins parallel, unevenly spaced and of uneven thickness with coarser veins prominent; margins ribbed, not coloured.

Fibre. In remains of unprepared leaf, fibre bundles oval or crescent-shaped, finely striate, coarse, stiff, straight, dull, medium to dark brown, with some fragments of epidermis often attached at each side, c. 0.4 - 0.5 mm wide.

In specimens of dressed fibre, bundles similar but finer, c. 0.2 - 0.3 mm wide.

Cordyline indivisa (Forst.f.) Steud. toi

Leaves long, wide, flat, very leathery, sword-shaped, 1-2 m long, 10 - 15 cm wide; contracted above a broad sheathing base; brown; midrib reddish, thick, prominent at base; veins strong, parallel, reddish.

Upper surface of leaf dull, glabrous, bright yellowish brown to dark brown; midrib prominent, wide, flat or grooved, reddish or orange; veins parallel, oblique to midrib, fine, uneven, with many prominent side veins, reddish or orange; margins thin.

Lower surface of leaf dull, glabrous, paler than upper surface; midrib prominent, wide, flat at base, keeled further up, reddish or orange; veins similar to upper surface but less prominent; margins thin.

Fibre similar to *C. australis*, but slightly coarser and darker.

Selected archaeological specimens in the Herbarium of the Auckland Institute and Museum from cave sites are:—

Herb. AK 126256 (Eth. 24338) Aorangi I., Poor Knights Islands, C. A. Fleming, 1938; bundle of fibre, some plaited. (Fig. 19).

Herb. AK 125882 (Eth. 23887) Anawhata, F. Mappin & A. T. Pycroft, 1928; knotted leaf. (Fig. 11).

Herb. AK 125883 (Eth. 17114) Paratutai, Whatipu, J. Donald & G. Fairfield, 1931; remains of plaited mat.

Herb. AK 126248 (Eth. 35842) Lake Taupo, W. H. Boucher, 1957; remains of top of rain cape. (Fig. 3).

Herb. AK 126427 (Eth. 35883) same locality, collector and date; remains of basket, 26 x 25 cm, made of strips 2 - 5 mm wide. (Fig. 41).

Herb. AK 126052 (Fiordland, P. J. F. Coutts, 1969; fragment of woven dressed fibre. (Fig. 29).

Herb. AK 122439 & 122422 same locality, collector and date; plaited cordage. (Fig. 17).

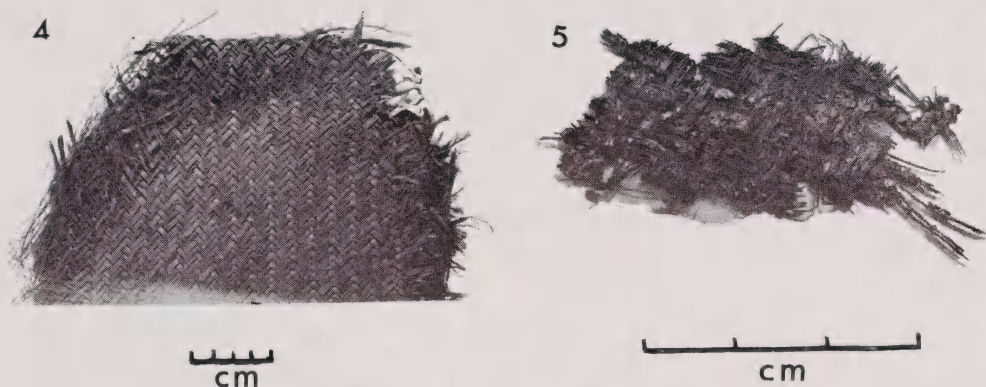
Herb. AK 122115 same locality, collector and date; remains of *Cordyline* leaf. (Fig. 18).

Herb. AK 121863 same locality, collector and date; remains of *C. indivisa* leaf.

Diagnostic characteristics of *Cordyline* leaf are the unevenly spaced ribs (veins) on the epidermis and, in *C. indivisa*, the reddish midrib and prominent side ribs. The fibre is coarser, stiffer and darker than *Phormium* and makes more open plaited cordage.

***Freycinetia banksii* A. Cunn. (Agavaceae) kiekie**

The leaves of the one New Zealand species of *Freycinetia* were described by Cheeseman (1925, p. 123) as "numerous towards the tips of the branches, 1½ - 3ft long, ½ - 1 in. broad, linear-elongate, finely acuminate, broadly sheathing at the base, concave, coriaceous, nerved, margins and midrib minutely spinulose-serrate."



Figs. 4, 5. *Freycinetia banksii*. 4. Taupo; plaited fragment, Eth. 35828. 5. Fiordland; plaited fragment, Herb. AK 126053.

The Maori used kiekie leaves for plaiting (Figs. 4,5) into floor mats, panels, belts and baskets and the fibre in rain capes. The written records of this are:—

baskets — Colenso 1869a, p. 36; Hamilton 1896 - 1901, p. 295; Best 1924b, p. 525; Cheeseman 1925, p. 123.

belts — Best 1924c, p. 205.

lattice-work panels — Colenso 1869a, p. 35; Best 1924c, p. 237.

mats — Colenso 1869a, p. 35, 1869b, p. 14; Hamilton 1896-1901, pp. 273, 297; Best 1899, p. 655, 1924b, p. 525, 1924c, p. 207; Buck 1926a, p. 27.

rain capes — Colenso 1869a, p. 33; Hamilton 1896 - 1901, pp. 281,288; Best 1899, p. 642, 1924b, p. 518; Buck 1911, p.87, 1926a pp. 51,129, 1949, p. 167; Mead 1969, p. 118.

Selected reference specimens in the Ethnology collections of the Auckland Institute and Museum are:—

Eth. 18108 basket "used to contain karaka berries", plaited, of leaf strips, 1.5 cm wide; 68 x 43 cm; 1932.

Eth. 8238 basket, round, closely plaited, of strips 3 mm wide; 38 x 26 cm (flattened); 1924. (Fig. 54).

Eth. 38128.1 basket, closely plaited, of leaf strips 4 mm wide; 47 x 30 cm; "Okere, Rotorua, made c.1930", 1967. (Fig. 64).

Eth. 8234 basket "made of kiekie to hold weaving material", plaited, of strips 4 mm wide, with fringe of fibre at top of basket; 22 cm x 20 cm; Ruatoki, 1902. (Fig. 47).

- Eth. 5003 basket in twilled pattern, closely plaited, of leaf strips 3 mm wide; 50 x 24 cm; 1924. (Fig. 65).
- Eth. 660 basket in twilled pattern, of leaf strips 3 mm wide; 29 x 18 cm; Waiuku, 1897. (Fig. 59).
- Eth. 19483 belt, folded, plaited, of leaf strips 3 mm wide; 111 x 6.5 cm; (measured without ties); 1933. (Fig. 38).
- Eth. 315 rain cape tags of leaf strips 7 mm wide, together with dark brown *Phormium* leaf tags, on foundation of woven *Phormium*; cape 190 x 115 cm; 1887.
- Eth. 4576 mat, plaited, of strips 5 mm wide, with black pattern of dyed *Phormium* strips; 254 x 226 cm; illustrated by Buck 1949, pl. 6; Waikato, 1930.

Maori preparation of kiekie

In the preparation of kiekie for plaiting into mats the Maori split the leaves into narrow strips which were then bleached by hanging them in the sun until half-dry and then threshing them on the ground until quite white (Best 1899, p. 655). To obtain the fibre, kiekie had to be put through a retting process, and the leaves were steeped in water, until only the fibre remained (Hamilton 1896-1901, p. 288; Best 1899, p. 642). Buck (1949, p. 167) described a method to remove the extraneous tissue from soaked leaves by pulling them through the fingers until only the fibre was left. Another process described by Buck (1911, p. 87) was the softening of leaf strips in a steam oven, before soaking in still water and finally scraping to obtain the fibre.

Characters for the identification of *Freycinetia banksii* leaves in archaeological and ethnological material are:—

Leaves long, narrow, 46 - 100 cm long, 2 - 2.5 cm wide; light brown; midrib and margins minutely toothed; veins parallel. (Wide side veins on fresh leaves not apparent in dried material).

Upper surface of leaf slightly shiny, glabrous, putty colour to light brown; midrib not apparent; margins minutely toothed; parallel veins fine.

Lower surface of leaf (Fig. 68) dull, glabrous, light brown; midrib prominent and minutely toothed; margins minutely toothed; parallel veins more distinct than on upper surface; stomata sometimes apparent.

Fibre. In archaeological remains, fibre bundles round or oval, soft, shiny, putty coloured; c. 0.3 mm wide.

Voucher specimens of material from cave sites in the Herbarium of the Auckland Institute and Museum are:—

- Herb. AK 126038 (Eth. 21172.2) Taupo Bay, Whangaroa, V. Fisher, 1934; small bundle of fibre.
- Herb. AK 125881 (Eth. 23887.1) Anawhata, F. Mappin & A. T. Pycroft, 1928; large fragment of rain cape.
- Herb. AK 125879 (Eth. 23887.2) same locality, collectors and date; 3 wide plaits of fibre from cape(?); plaits 1.5 - 2.5 cm wide. (Fig. 26).
- Herb. AK 126046.2 (Eth. 23883.1) same locality, collectors and date; fragment of mat made of *Freycinetia* and *Phormium*.
- Herb. AK 126270 (Eth. 19775.4) Piha, F. Mappin, 1933; fragment (18 x 10 cm) of basket(?), of twilled plait, of leaf strips 5 mm wide. (Fig. 31).
- Herb. AK 126048 (Eth. 19776) same locality, collector and date; remains of folded belt, 119 x 10 cm; twilled plait, of leaf strips 2 mm wide. (Fig. 37).
- Herb. AK 126130 (Eth. 43127.1) Piha, E. Willis, 1959, basket with two handles, 30 x 17 cm; plaited, of leaf strips 4 mm wide. (Fig. 43).

- Herb. AK 126129 (Eth. 35827) Lake Taupo, W. H. Boucher, 1957; remains of folded belt, 30 x 8 cm; plaited, of strips 2 mm wide. (Fig. 40).
- Herb. AK 126128 (Eth. 35838) same locality, collector and date; remains of basket probably 52 x 28 cm, plaited, of leaf strips 3 mm wide. (Fig. 39).
- Herb. AK 126187 (Eth. 35828) same locality, collector and date; long plaited fragment, probably part of mat; 56 x 23 cm, of leaf strips 4 mm wide. (Fig. 4).
- Herb. AK 126258 (Eth. 35831.1-3) same locality, collector and date; several lengths of rope up to 160 cm long, c. 1.5 cm diameter; of leaf strips 5mm wide (Fig. 21).
- Herb. AK 126053 Fiordland, P. J. F. Coutts, 1969; fragment of twilled plaited material, of strips 2mm wide. (Fig. 5).

Distinguishing features of *Freycinetia banksii* are the pale, coarse but soft fibre, and the minute teeth on leaf midribs and margins.

Cortaderia toetoe Zotov (Gramineae) toetoe

Toetoe is a tall, perennial, reed-like grass with graceful drooping flower panicles on stems up to 3 metres high. It was described by Cheeseman (1925, p. 180) under *Arundo conspicua* Forst.f. as, "Forming huge dense tussocks with numerous long curving leaves. Culms 3-10 ft high, as thick as the finger at the base, slender, erect, smooth, hollow. Leaves long, narrow, coriaceous, flat or involute, strongly nerved, smooth or scabrid along the margins and on the nerves of the upper surface; sheaths long, smooth; ligules reduced to a transverse band of short stiff hairs . . ."

The leaves and dried flower stalks were used by the Maori for several purposes. The roofs and walls of houses were thatched with layers of stalks and leaf, and split stalks were used as lining in decorative inside wall panels (tukutuku) and as battens for kites. The leaves were probably plaited into floor mats and there is a plaited basket in the Ethnology collection of the Auckland Institute and Museum, which was used for cooking food in thermal pools at Rotorua.

The Maori uses of *Cortaderia*, cited in the literature, are:—

baskets — Colenso 1869a, p.36.

kites — Best 1924b, p. 119, 1925b, p. 75.

lining for roofs and walls of houses — Colenso 1869a, p. 35; Hamilton 1896-1901, p. 85; Best 1924c, p. 235; Cheeseman 1925, p. 181; Buck 1949, p. 127.

mats — Colenso 1869b, p. 14.

thatch — Buck 1949, p. 127.

Examples in the Ethnology collections of the Auckland Institute and Museum are:—

Eth. 1050 basket, plaited, of leaf strips 2 mm wide; 33.5 x 18 cm; 1927.

Eth. 31052 basket, plaited, of leaf strips 4 mm wide; 19 x 18 cm, with loops at top threaded with long *Phormium* rope, 120 x 1 cm; "used for cooking in boiling pools"; Rotorua; 1949. (Fig. 52).

Eth. 5068 kite, triangular, 67 x 67 x 52 cm; *Typha* laced on *Cortaderia* stalks; Urewera; 1903.

The Maori meeting house, Hotunui, in the Auckland Museum, has a thatch of toetoe leaf and decorative panels of toetoe stalks (kakaho).

Characters for the identification of *Cortaderia toetoe* leaf in archaeological and ethnological material are:—

Leaves long, stiff, flat or involute; up to 2 m long x 1.5 cm wide, tapering to thin point; long basal sheath expanding to c. 3.5 cm at base; midrib continuing down sheath; margins smooth towards base, rough to touch towards tip, with small prickles; pale yellow-green to yellow-brown; veins parallel.

Upper surface of leaf slightly lustrous, flat or rolled, glabrous, pale yellow-green to yellow-brown; midrib hard, prominent, rounded; margins with small prickles; parallel veins ridged, flat-topped.

Lower surface of leaf dull, flat or rolled, scabrous; paler colour than upper surface; midrib and several side veins prominent; smaller veins flat-topped, with minute prickles between veins; margins with small prickles.

Fibre. In archaeological material, dark brown, coarse, stiff, flat, striate; c. 2 mm wide; pieces of hard midrib c. 3 mm wide.

A voucher specimen of archaeological material in the Herbarium of the Auckland Institute and Museum is:—

Herb. AK 126272 (Eth. 26448.3) cave site, Piha, W. E. Browne, 1941; remains of large plaited basket with plaited cord at top. (Fig. 33).

Diagnostic characters of this *Cortaderia* are the hard midrib, pronounced side ribs and flat-topped smaller ribs, the roughness of the lower surface and the prickles on the margins of the leaves.

Rhopalostylis sapida Wendl. & Drude (Palmae) nikau

Two species of *Rhopalostylis* are keyed and described by Moore and Edgar (1970, p. 96); one is found in the Kermadec Islands and one in New Zealand. The latter is *Rhopalostylis sapida*, which is abundant in the North Island, and found in lowland coastal areas in the South Island as far south as Banks Peninsula and Hokitika. Cheeseman (1925, p. 281) described the leaves as "forming a terminal crown, pinnate; petiole long, furnished at the base with a long and broad sheathing part. Leaflets long, narrow, acuminate, slightly falcate at the apex, 3-costulate; secondary nerves several, distant; margins thin."

The leaves were used by the Maori for making baskets, lining roofs, and possibly for floor mats and cooking. Records from the literature are:—

baskets — Colenso 1869a, p. 36; Hamilton 1896-1901, p. 338, pl. 44, fig. 1; Buck 1923, pp. 709, 726, 1949, p. 154.

floor mats — Colenso 1869b, p. 14; Buck 1949, p. 149.

in cooking rats wrapped in leaves — Best 1924b, p. 502.

roof lining — Hamilton 1896-1901, p. 90.

An example in the Ethnology collection of the Auckland Institute and Museum is:—

Eth. 6402 basket (kete nikau), 32 x 27 cm, of leaf strips 8-12 mm wide; Kaipara, 1923. (Fig. 56).

Characters for the identification of *Rhopalostylis sapida* leaf in archaeological material are:—

Leaves pinnate, 1 - 3 m long; numerous leaflets *c.* 1 m long, 25 - 50 mm wide, linear sword-shaped; greenish brown; midrib and main veins fairly prominent; veins distant with faint transverse arched veinlets; margins thin.

Upper surface of leaflet dull, glabrous, greenish brown; midrib apparent; veins parallel, widely spaced, connected by infrequent arched veinlets; two stout side veins apparent; margins thin, not coloured.

Lower surface of leaflet similar to upper surface except midrib prominent, often reddish.

Fibre. In unprepared leaf remains, fibre bundles round, fine and coarse, striate, soft, sometimes shiny, mostly attached to epidermis, light brown, *c.* 0.2 - 0.45 mm wide.

Voucher specimens of archaeological material from cave sites, in the Herbarium of the Auckland Institute and Museum are:—

Herb. AK 125878 (Eth. 23887) Anawhata, F. Mappin and A. T. Pycroft, 1928; leaflets roughly plaited in a circle. (Fig. 30).

Herb. AK 121810 Fiordland, P. J. F. Coutts, 1969; fragments of leaf. (Fig 13).

Diagnostic characters for the recognition of *Rhopalostylis sapida* leaflets are the green colouring within the tissue, the prominent reddish midrib, the two widely spaced side veins, and the occasional arched linking veinlets.

Astelia (Liliaceae) perching lily

Cheeseman (1925, p. 312) in listing twelve species of *Astelia* described the leaves of the genus as, "numerous, linear, all radical or crowded near the base of the stem, with broad imbricate sheathing bases." Thirteen species are keyed and described by Moore and Edgar (1970, p. 28). Moore (1966, p. 202) described asteliads as "perennial tufted herbs, the smallest, with leaves at most a few centimetres long . . . while the largest could be mistaken for *Phormium*." Common names for some of the species are given as "bush flax", "tree flax", "perching lily", "kauri-grass", and "kahakaha" or "kokaha" (Andersen 1926, p. 680).

The leaves were used by the Maori for food baskets, oven bands and possibly other temporary purposes. The evidence for this from the literature is:—

food baskets — Best 1903, p. 55, 1924a, p. 419; Buck 1923, p. 708.

oven bands — Best 1903, p. 89, 1924a, p. 417.

No articles made of *Astelia* were found in the Auckland Institute and Museum Ethnology collections.

It is likely that the Maori used several species of *Astelia*. From the width and length of the leaf fragments and the presence of stout reddish side veins, in recently examined Fiordland archaeological material, it is probable that the plant used there was *A. nervosa* Hook. f. and also perhaps *A. petriei* Ckn. The remains of a small basket in Auckland archaeological material appear to be leaves of *A. trinervia* Kirk.

As the asteliads are difficult to identify even in flowering specimens, no specific status has been given to the leaf fragments discussed here.

Characters for the identification of *Astelia* leaves in archaeological and ethnological material are:—

Leaves long and narrow, up to 183 cm long, 2-7 cm wide; brown or greyish brown; midrib and two stout side veins sometimes reddish; veins parallel.

Upper surface of leaf dull, glabrous, brown; midrib not always apparent; parallel veins rather widely spaced; two side veins apparent, sometimes stout and coloured; margins thin, in some species recurved.

Lower surface of leaf dull, some appressed silky hairs; silvery-brown; midrib usually conspicuous, sometimes reddish; two stout side veins sometimes more prominent than midrib; margins thin.

Fibre. In unprepared leaf remains, fibre bundles flat and crescent-shaped, slightly hairy, soft, coarse, dull pink-brown; c. 0.25-0.4 mm wide.

Voucher specimens of archaeological material from cave sites, in the Herbarium of the Auckland Institute and Museum are:—

Herb. AK 125193 (Eth. 19775.1) Piha, F. Mappin, 1933; remains of food basket, 18 x 13 cm, plaited, of leaf strips 14-18 mm wide. (Fig. 34).

Herb. AK 126252 (Eth. 35825) Lake Taupo, W. H. Boucher, 1957; basket, 28 x 17 cm with 2 handles; open plait; of leaf strips 3-7 mm wide. (Fig. 35).

Herb. AK 121856 Fiordland, P. J. F. Coutts, 1969; remains of knotted leaf. (Fig. 12).

Herb. AK 122070 same locality, collector and date; remains of plaited leaves.

Herb. AK 123225 same locality, collector and date; thin plait of fibre c. 5 cm long.

Diagnostic characters for the recognition of asteliad leaf remains are the two stout side veins and the slightly hairy fibre.

Dracophyllum (Epacridaceae) grass tree

Thirty-five species of *Dracophyllum*, native to New Zealand, are described in *Flora of New Zealand* Vol. 1, 1961, by H. H. Allan. The leaves are "simple, of linear order, usually minutely serrulate-crenulate on margins; base prolonged into an appressed sheath . . ." (Allan 1961, p. 521).

In the literature consulted, only Colenso claimed that the Maori used *Dracophyllum* leaves:—

clothing — Colenso 1869a, p. 33, 1869b, p. 14.

As yet no *Dracophyllum* has been found in Ethnological material, nor has the *D. latifolium* of the north, quoted by Colenso, been found in cave remains. From recent examination of plant fragments from Fiordland excavations there is evidence that strips of *Dracophyllum* leaf were plaited into matting or baskets, also into fine cordage. In Fiordland both *D. menziesii* and the larger *D. fiordense* were probably used.

Characters for the identification of *Dracophyllum* leaves in archaeological material are:—

Dracophyllum menziesii Hook.f.

Leaves reflexed, rigid, leathery, red-brown; 7 - 20 cm long, 1 - 2 cm wide at base, gradually tapering to fine point; midrib not very apparent; margins thick, coloured yellow-orange, serrulate to crenulate (with minute pointed or rounded teeth); fine parallel veins.

Upper surface of leaf slightly shiny, glabrous, red-brown; midrib sunken; fine parallel veins slightly ridged; stomata faint.

Lower surface of leaf slightly shiny, glabrous, red-brown; midrib not apparent; fine parallel veins; stomata obvious between veins.

Fibre sparse, flat, soft, brown; fragments of brown or reddish epidermis adhering; 0.2 - 0.3 mm wide.

Dracophyllum fiordense W. R. B. Oliver.

Leaves reflexed, rigid, leathery, red-brown; up to 70 cm long x 5 cm wide at base, gradually tapering to sharp point; margins thin, shining, smooth, without teeth; fine parallel veins.

Upper and lower surface of leaf similar to *D. menziesii*; only margins different, i.e. without teeth.

Fibre similar to *D. menziesii*.

Selected voucher specimens of Fiordland archaeological material in the Herbarium of the Auckland Institute and Museum are:—

Herb. AK 122227 Fiordland, P. J. F. Coutts, 1969; fragments of leaf. (Fig. 15).

Herb. AK 123242 same locality, collector and date; remains of thin plait of fibre 20 cm long.

Herb. AK 126106 same locality, collector and date; fragments of plaited mat or basket(?); 10 x 7 cm; of leaf strips 1 mm wide. (Fig. 16).

Diagnostic characteristics of *Dracophyllum* are the stomata between the veins and in *D. menziesii*, the toothed margins of the leaf and the reddish colour of the epidermis. (Fig. 69).

***Bulbinella gibbsii* Ckn. var. *balanifera* L. B. Moore (Liliaceae)**

Three species of the genus *Bulbinella* were keyed and described by Cheeseman (1925, p. 322) and these were increased to six by Moore and Edgar (1970, p. 22). *Bulbinellas* are "summer-green perennial herbs" with fleshy strap-shaped leaves (Moore 1964, p. 287-288). *Bulbinella gibbsii* Ckn var. *balanifera* grows in Fiordland.

From recent examination of plant remains from archaeological sites in Fiordland it is apparent that *Bulbinella* leaves were gathered by the Maori and made into plaited baskets and floor mats.

There are no references to Maori use of *Bulbinella* sp. in the literature studied, and no artifacts in the Ethnology collections.

Characters for the identification of *Bulbinella gibbsii* var. *balanifera* leaves in archaeological material are:—

Leaves fleshy, glabrous, concave above, strap-shaped, tapering to blunt tip; 12-22 cm long, 1 - 3 cm wide; yellow-brown; no midrib; margins ribbed, *c.* 0.5 mm wide, coloured yellow or red-brown; veins fine, parallel.

Upper surface of leaf lustrous, glabrous, soft, thin, yellow-brown; no midrib (leaf tubular); veins parallel, fine, close, evenly spaced, not very apparent.

Lower surface of leaf dull, glabrous, soft, thin, paler than upper surface; no midrib; veins parallel, fine, close, evenly spaced (6 ridges to 1 mm) more distinct than upper surface.

Fibre. In remains of unprepared leaf, fibre bundles, when present, oval, slightly hairy, harsh, coarse, dull, very brittle, reddish-brown, *c.* 0.3 - 0.4 mm wide.

Selected voucher specimens of Fiordland archaeological material in the Herbarium of the Auckland Institute and Museum are:—

Herb. AK 121804 Fiordland, P. J. F. Coutts, 1969; fragments of plaited basket (with crayfish remains); leaves *c.* 2cm wide.

Herb. AK 122362 same locality, collector and date; remains of rough plait of leaves; *c.* 22 x 2.5 cm. (Fig. 1).

Herb. AK 121858 same locality, collector and date; remains of leaves 2 cm wide. (Fig. 9).

Herb. AK 122431 same locality, collector and date; fragments of plaited leaf strips 2 mm wide.

Herb. AK 123188 same locality, collector and date; remains of plaited ropes; one piece 38 cm x 7 mm.

Diagnostic characters for the recognition of this *Bulbinella* are the yellow-brown, soft, tubular leaves with no midrib, and the thickened coloured margins (Fig. 67).

FIBRE-PLANTS IN ETHNOLOGICAL COLLECTIONS

Under this heading, plant material from selected Maori artifacts in the Ethnological collections of the Auckland Institute and Museum is identified. Where possible, references to literature applying to the Maori use of similar plants are listed, but none of these plants have been seen in the archaeological collections examined.

Desmoschoenus spiralis (A. Rich.) Hook.f. (Cyperaceae) pingao.

This sedge, 60 - 90 cm high, is abundant on sand dunes on the New Zealand coast. Under the synonym *Scirpus frondosus*, Cheeseman (1925, p. 224) described the leaves as "spreading, often curved, rigidly coriaceous, channelled above, keeled beneath, gradually narrowed into long trigonous points, at the base expanded into broad membranous sheaths; margins and keel sharply denticulate." The leaves when dry are bright yellow and were used by the Maori for the coloured designs in mats, baskets and belts; also in the lattice-work panels of their houses. It is said that "Inland tribes imported the prepared material from their coastal friends" (Buck 1923, p. 708).

References to the Maori uses of pingao are:—

baskets — Buck 1923, p. 708; Cheeseman 1925, p. 225.

belts — Colenso 1869a, p. 33; Buck 1923, p. 708, 1924, p. 348; Best 1924b, p. 520, 1924c, p. 205.

cloaks — Cheeseman 1925, p. 225; Moore and Edgar 1970, p. 171.

lattice-work panels — Colenso 1869a, p. 35; Buck 1923, p. 708; Best 1924c, p. 237.

mats — Buck 1923, p. 708.

Selected reference specimens in the Ethnology collections of the Auckland Institute and Museum are:—

Eth. 18811 basket, small, yellow, plaited, of leaf strips 2 - 6 mm wide; 16.5 x 10 cm; Bay of Islands, 1932. (Fig. 48).

Eth. 37471.3 basket, cream and yellow (natural *Phormium* with pingao design), of leaf strips 3 mm wide; 41 x 21 cm; Opotiki, 1963.

Eth. 37471.9 basket, white, yellow and black (kiekie, pingao and dyed *Phormium*) of leaf strips 5 mm wide; 53 x 27 cm; Opotiki, 1963.

Eth. 9992 basket, black and yellow (dyed *Phormium* and pingao), of leaf strips 4 mm wide; 44 x 26 cm; 1926. (Fig. 58).

Eth. 1854 belt, folded, yellow, plaited, of leaf strips 2 mm wide; 94 x 9 cm; 1928.

Eth. 8219 mat, natural *Phormium* with pingao design, partly made; Ohinemutu, 1925.

Characters for the identification of *Desmoschoenus spiralis* leaf in archaeological and ethnological material are:—

Leaves long, narrow, stiff, folded, often curved; 50 - 60 cm long, 5 - 8 mm wide; gradually tapering to fine point; thin basal sheath up to 6 cm long expanded to 3 cm wide at base; bright yellow; midrib keeled below, with fine teeth; margins with irregular fine, prickly teeth, rough to the touch; veins fine and parallel.

Upper surface of leaf slightly lustrous, glabrous, convex, bright yellow; midrib smooth, grooved; stomata apparent between parallel veins.

Lower surface of leaf dull, glabrous, concave, bright yellow; midrib with fine teeth, keeled; veins slightly more ridged than above, stomata apparent between veins.

Fibre sparse, fine, white, shiny, stiff, straight, flat, c. 0.07 mm wide.

The most obvious diagnostic character of dried pingao is the bright yellow colour.

So far, no *Desmoschoenus spiralis* has been found in archaeological material.

***Typha orientalis* C. B. Presl. (Typhaceae) raupo or bulrush**

Typha is found in marshy areas throughout the world and the only species native to New Zealand is *T. orientalis* which is the *T. angustifolia* of Cheeseman (1925, p. 121). It grows up to 3m tall, "usually in large colonies" and is "summer-green" (Moore and Edgar 1970 p. 90). The narrow leaves are sometimes longer than the flowering stems and expand at the base into a convex sheath often up to 30 cm long (Cheeseman 1925, p. 121).

There is evidence that raupo leaves were used extensively for the inner thatching of the walls of Maori houses. Other uses were for canoe sails, fishing rafts, kites and poi. For canoe sails, Best (1925a, p. 179 - 180) said the leaves of raupo were used whole and, not possessing any fibre, were not split or plaited, but laced together by ties at intervals.

References from the literature are:—

- canoe sails — Colenso 1869a, p. 35; Best 1925a, pp. 179-187.
 fishing floats — Colenso 1869a, p. 35; Best 1924c, p. 251.
 fishing rafts — Best 1925a, pp. 137 - 141.
 kites — Best 1924b, p. 118, 1925b, pp. 67-79; Buck 1949, p. 248.
 poi — Best 1924c, p. 136, 1925b, p. 56; Dodge 1941, p. 22, pl. 7; Buck, 1949, p. 243.
 thatch — Colenso 1869a, p. 34; Best 1924b, pp. 567 - 569, 1924c, p. 230; Cheeseman 1925, p. 122; Buck 1949, p. 122.

Selected reference specimens in the Ethnology collections of the Auckland Institute and Museum are:—

- Eth. 781 floats, almost round, c. 20 cm diameter, made of strips up to 3 cm wide; Kaipara, 1899.
 Eth. 782 poi (pair) oval made of strips 2 cm wide; 12 x 7.5 cm diameter, and 16 x 8.5 cm diameter; joined by *Phormium* ties about 30 cm long; Kaipara, 1899.
 Eth. 13984 strips of raupo prepared for making poi; 60 x 1.4 cm; Otahuhu, 1931.
 Eth. 204 kite, bird-like; 322 x 29 cm wing; 128 cm long body; strips of *Typha* sheath 2 - 3 cm wide, laced on frame of stakes; illustrated in Best 1925b, fig. 32. East Cape district, 1886.
 Eth. 5068 kite, triangular, 67 x 67 x 52 cm; strips of *Typha* leaf, 1.5 cm wide, laced on to toetoe stems; Urewera, 1903.
 Eth. 318 floats of rolls of *Typha* on fishing net; Thames, 1895.
 No number, raft or canoe, 295 cm long; of leaf up to 2 cm wide.

Characters for the identification of *Typha orientalis* leaf in archaeological and ethnological material are:—

Leaves long, narrow, sometimes longer than 244 cm, thin broad basal sheaths up to 5 cm wide, more than 30 cm long, leaf then narrowing to 1.5 cm; flat on one side, rounded on other, tapering, becoming flatter near tip; light brown; margins thin; no midrib; fine parallel veins.

Upper surface of leaf lustrous, glabrous, flat, slightly silky; fine parallel veins apparent; light brown.

Lower surface of leaf slightly lustrous, glabrous, convex; fine raised parallel veins; brown.

Fibre light, brittle, attached to epidermis.

Typha can be recognized by the papery sheath and the cavities in the internal spongy tissue of the leaf of dried material. When the two surfaces of the leaf are torn apart large cavities can be seen in the tissue — air space which makes *Typha* float so well (Fig. 66).

As yet, no archaeological fragments of *Typha* have been found.

Hierochloe redolens R.Br. (Gramineae) karetu

Hierochloe redolens, an erect, sweet-scented perennial grass, abundant in most places throughout New Zealand, was described by Cheeseman (1925, p. 147) as having, "Leaves numerous, shorter than the culms or almost equalling them, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, flat, deeply striate, smooth or minutely scaberulous, bright shining green; sheaths long, compressed, deeply striate; ligules broad, scarious."

The scented leaves were plaited into belts and worn by Maori women and the grass was also strewn on the floors of houses. References to these uses in the literature are:—

belts — Hamilton 1896 - 1901, p. 291; Best 1899, p. 648, 1924b, p. 522, 1924c, p. 205, fig. 92; Mead 1969, p. 120.

floor covering — Colenso 1869a, p. 36.

Selected reference specimens in the Ethnology collections of the Auckland Institute and Museum are:—

Eth. 730 woman's belt made of 11 plaited cords 73 cm x 5 mm, with dyed *Phormium* ties 68 cm long; Urewera, 1899.

Eth. 5330 woman's belt made of 5 plaited cords 123 cm x 5 mm, with plain *Phormium* ties 56 cm long; 1908.

Characters for the identification of *Hierochloe redolens* in archaeological and ethnological material are:—

Leaves thin, up to 1 m long, 0.6 - 1.27 cm wide; shining light brown; rough to touch on lower surface.

Upper surface of leaf lustrous, glabrous, flat, striate; shining light brown; midrib inconspicuous; margins ribbed; fine parallel veins, evenly spaced.

Lower surface of leaf dull, scaberulous, flat, pale brown; midrib inconspicuous; margins ribbed, with prickle hairs below; parallel veins fine, flat-topped, covered in minute prickle-hairs.

Fibre not separated from epidermis.

As yet, no archaeological fragments of *Hierochloe* have been seen.

Hierochloe redolens can be recognized by the shining, thin, brown leaf which has prickle hairs on the veins of the lower surface.

***Eleocharis sphacelata* R.Br. (Cyperaceae) kutakuta**

This tall sedge is found in swamps and on margins of lakes throughout New Zealand from sea level to *c.* 800 m altitude. Cheeseman (1925, p. 216) described the stems of *Eleocharis sphacelata* as "stout cylindrical, 1 - 3 ft. high, $\frac{1}{3}$ in. diam., hollow, transversely septate; sheaths long, membranous." Moore and Edgar (1970, p. 188) describe the raised rings on the culms (stems) of these perennial leafless herbs as "internal transverse septa externally distinct at intervals of 1 - 10 cm, interspersed with septa not visible externally . . ."

The Maori name *kutakuta* has been used for two plants in the *Cyperaceae*. *Eleocharis sphacelata* in Andersen (1926, p. 689) is called *ngawha* or *kutakuta*, whereas in Cheeseman (1925, p. 1089) and in Allan (1961, p. 1001) *paopao* or *kutakuta* is applied to *Scirpus lacustris*. Buck (1923, p. 708) listed *S. lacustris* for floor mats and Best (1925b, p. 75) listed *E. sphacelata* (*kuta*) as a sedge used in making kites.

It is known that in recent times, at Ahipara, North Auckland, *E. sphacelata* growing in fresh-water ditches was used for many years by a local Maori family in the making of soft mats (Mrs R. C. Cooper, pers. comm.).

Selected voucher specimens in the Ethnology collections of the Auckland Institute and Museum are: —

- Eth. 9229 basket, closely plaited, of stems 11 mm wide, with upper edge and two rows on the body of the basket serrated; 40 x 26 cm; Ohinemutu, 1926. (Fig. 55).
 Eth. 6012 basket, small, closely plaited, of stems 8 mm wide, serrated at top; rectangular base 11 x 8.5 cm, 11 cm high (no join at base); Rotorua, 1915. (Fig. 49).
 Eth. 44182 mat, plaited, of stems 1 cm wide; 192 x 111 cm; shining yellow-brown; soft; Waiotemarama, Hokianga (made in 1959), 1971.
 Eth. 4434 rain cape with folded tags of *E. sphacelata*; tags c. 16 cm long and 1.5 cm wide; Taranaki, 1929. (Fig. 7).

Characters for the identification of *Eleocharis sphacelata* in archaeological and ethnological material are:—

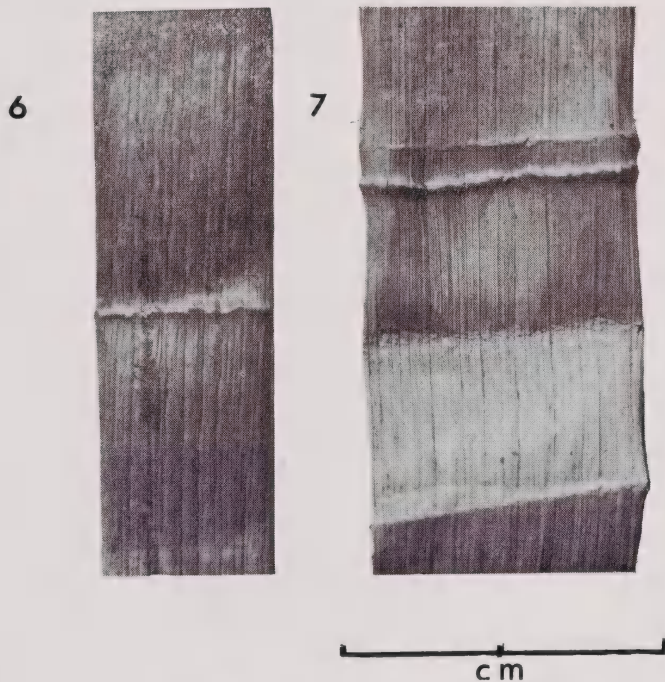
Stems erect, hollow, simple, without perfect leaves; transversely septate; 30.5-91.5 cm long, c. 1 cm diameter; light brown.

Outer surface of stem silky, glabrous, papery, finely striate; occasional raised rings at intervals up to 12 cm; light brown.

Inner surface of stem dull, glabrous, papery; numerous porous partition rings; paler than outer surface.

Fibre. Element of epidermis (Esau 1953, p. 205), not noticeably separated therefrom.

Eleocharis sphacelata is easily recognised in ethnological articles by the transversely septate stems, shown by thin raised rings at intervals along the flattened cylindrical stems (Figs. 6, 7).



Figs. 6, 7. *Eleocharis sphacelata*. 6. Dried herbarium specimen, Herb. AK 119696.
 7. Tag from rain cape, Eth. 4434.

There was no evidence of *E. sphacelata* in recently examined archaeological material.

***Uncinia rubra* Boott (Cyperaceae)**

Uncinia rubra was described by Cheeseman (1925, p. 249) as "Whole plant red, red-purple, or brownish red, usually forming a continuous sward. Culms 6 - 14 in. high, stout or slender, strict, rigid, leafy at the base, trigonous and scabrid above. Leaves much shorter than culms, rarely equalling or exceeding them, flat or slightly involute"

There is no record in the literature of this sedge being used by the Maori although several authors mention a red *Carex* known as "maurea" as used in the plaited cords of women's belts.

From a recent examination of a woman's belt (Fig. 8) in the Auckland Museum (Eth. 780), it is apparent that the sedge used was *Uncinia rubra*, not the reddish *Carex commans* as expected from notes in the literature. The long flower stems, or culms, were used rather than the shorter flat leaves. The belt was presented to the Museum by Mr Elsdon Best in 1899 and tallies with the description and measurements given by Buck (1924, p. 349) of a "tu-maurea", in the Auckland Museum.

Voucher specimen in the Ethnology collection of the Auckland Institute and Museum:—

Eth. 780 woman's belt made of 11 plaited cords, reddish brown; 86 x 3 cm; with black dyed *Phormium* ties 50 cm long; Urewera, 1899 (Fig. 8).



Fig. 8. *Uncinia rubra*; woman's belt, Eth. 780.

Characters for the identification of *Uncinia rubra* in archaeological and ethnological material are:—

(Leaves are not dealt with here as only stems were found in the item described).

Stems erect, rigid, round or bluntly triangular; c. 35 cm long x 1 mm diameter; reddish brown.

Outer surface of stem smooth, slightly shiny, ribbed; ribs finely striate; reddish brown.

Inner surface of stem dull, pithy, light brown.

Fibre attached to epidermis, coarse, flat, 0.2 mm wide.

This sedge can be recognized by the reddish colour and the smooth round or sometimes triangular flowering stems which may be scabrid towards the apex.

FIBRE-PLANTS IN LITERATURE ONLY

References are listed here to plants mentioned in the literature as having been used by the Maori. None of these plants have been found in the archaeological or ethnological material available.

Aciphylla sp. (Umbelliferae) spear grass.

sandals — Hamilton 1896 - 1901, p. 293; Best 1899, p. 653; Buck 1924, p. 357.

Asplenium bulbiferum (Aspleniaceae) mauku, hen and chickens.

cloaks — Hamilton 1896 - 1901, p. 290; Best 1899, p. 643.

Carex sp. (Cyperaceae).

belts — Hamilton 1896 - 1901, p. 292; Best 1899, p. 648, 1924b, p. 522; Buck 1923, p. 709, 1924, p. 348.

thatch — Colenso 1868a, p. 34.

Celmisia sp. (Compositae) mountain daisy.

cloaks — Hamilton 1897, p. 175, 1896 - 1901, p. 288.

rain capes — Mead 1969, p. 61.

Chionochloa sp. (Gramineae) tussock.

rain capes — Hamilton 1896 - 1901, p. 281.

Juncus sp. (Juncaceae).

thatch — Colenso 1869a, p. 34.

Leptocarpus similis (Restiaceae) oioi.

thatch — Colenso 1869a, p. 34.

Cyperus ustulatus (Cyperaceae)

kites — Best 1924b, pp. 118, 120, 1924c, p. 139.

thatch — Colenso 1869a, p. 34.

Scirpus lacustris (Cyperaceae) paopao, kutakuta.

(Sometimes confused with *Eleocharis sphacelata* — kutakuta).

mats — Buck 1923, p. 708.

S. maritimus (Cyperaceae)

(In Cheeseman 1925, p. 226).

thatch — Colenso 1869a, p. 34.

OTHER PLANTS

As they do not come under the category of fibre-plants, no account has been given here of the stems of vines and ferns, or of aerial roots of plants such as *Metrosideros* and *Freycinetia* used for binding and lashing. Fragments of some vines and ferns have been collected in cave sites, e.g. *Lygodium articulatum* (mangemange) and *Pteridium aquilinum* var. *esculentum* (fern or bracken), and the stems of these plants are seen in eel traps in the Ethnology collections, where *Rhipogonum scandens* (supplejack) is also seen in handles of fishing nets. The bark from *Hoheria* sp. was sometimes made into headbands and in modern times the ribbons of fibre are made into hats and fancy baskets.

Fibres not native to New Zealand were found in the Fiordland material, in fragments of rope and sacking or sailcloth, probably used by the early European sealers. The fibres identified were *Cocos* (Fig. 22), *Cannabis* and *Cochorus*.

KEY

A key to the fibre-plant material described above as being found in archaeological and ethnological collections is presented as an aid to identification.

KEY TO FIBRE-PLANT MATERIAL USED BY THE MAORI

- | | | |
|----|---|--|
| 1 | Material used a stem, finely striate | 2 |
| | Material used a leaf, parallel veined | 3 |
| 2 | Stem c. 1cm diameter, flattened, pale brown, transversely septate at intervals of up to 12cm | <i>Eleocharis sphacelata</i> |
| | Stem c. 1mm diameter, round, reddish brown, not transversely septate | <i>Uncinia rubra</i> |
| 3 | Midrib absent | 4 |
| | Midrib present | 6 |
| 4 | Leaf reddish, fine veins with stomata obvious between, margins sometimes serrulate or crenulate | <i>Dracophyllum</i> |
| | Leaf brownish, fine veins with stomata not obvious between, margins entire | 5 |
| 5 | Leaf light brown, margins thin | <i>Typha orientalis</i> |
| | Leaf yellow-brown, margins ribbed and coloured | <i>Bulbinella gibbsii</i> var. <i>balanifera</i> |
| 6 | Midrib and margins minutely toothed | 7 |
| | Midrib and margins not minutely toothed | 8 |
| 7 | Leaf light brown, up to 2.5cm wide | <i>Freycinetia banksii</i> |
| | Leaf bright yellow, 5-8mm wide | <i>Desmoschoenus spiralis</i> |
| 8 | Veins evenly spaced | 9 |
| | Veins not evenly spaced, often 2 or more prominent side veins | 10 |
| 9 | Leaf wide, 5-13cm, smooth; midrib keeled below; margins smooth, coloured | <i>Phormium</i> |
| | Leaf narrow, up to 1.2cm, with minute prickles below; midrib inconspicuous; margins with small prickles, not coloured | <i>Hierochloa redolens</i> |
| 10 | Midrib apparent above and below | 11 |
| | Midrib not apparent above | <i>Cordyline</i> |
| 11 | Minute prickles between veins below; margins with small prickles | <i>Cortaderia toetoe</i> |
| | No prickles, margins thin, without prickles | 12 |
| 12 | Leaf greenish brown; parallel veins connected by transverse veinlets | <i>Rhopalostylis sapida</i> |
| | Leaf greyish-brown; no transverse veinlets | <i>Astelia</i> |

SUMMARY AND CONCLUSION

There is evidence in the plant material identified from cave sites in the Auckland Province and from the Fiordland excavations, that the Maori made use of available leaves suitable for his needs of the moment — for temporary baskets and mats, fishing lines and nets. This is apparent in the plaited *Bulbinella* fragments from Fiordland where the plant is abundant. Here too, *Dracophyllum* is plentiful and in archaeological remains portions of leaf were seen as well as fragments of closely plaited material and twine made of one of the “grass trees”. A species of *Dracophyllum* may well have been used in the north also, but none was found in the plant remains examined. Colenso claimed that *Dracophyllum* was used for clothing but no examples have been found in the Museum Ethnology collections.

Proof that *Astelia* leaf was used for plaiting in both the North and South Islands can be seen in the remains of baskets found in cave sites at Piha and Taupo, and the plaited leaf and fibre from Fiordland sites — made of different species. There are no such preserved articles in the Ethnology Department at the Museum, but two authors mention *Astelia* as used by the Maori.

Freycinetia leaf and fibre in remains of plaited material were plentiful in collections from the northern sites; whereas from Fiordland only one fragment was seen (of fine plaitwork). In the forest, *Freycinetia* is not so common in the far south. *Rhopalostylis* occurred once, unexpectedly, in the Fiordland material; also only once in the northern sites and once as a basket in the Ethnology Department, although there is evidence in the literature of several Maori uses of this “palm”.

A foreseen result was the predominance of *Phormium* leaf and fibre in the plant fragments from both northern and southern localities. Next in order of quantity, from the Auckland Province, was *Freycinetia* followed by *Cordyline* (well represented in many Ethnology specimens). In Fiordland material, *Cordyline* was second to *Phormium*, then *Bulbinella* in surprising amounts.

Identification of the plants used in clothing, mats, baskets and cordage, held in the Ethnology collections of the Auckland Museum may dispel a fairly widespread belief that all such Maori articles were made of flax (*Phormium*). *Cordyline* and *Freycinetia* can be seen in beautifully made rain capes and baskets, and there are more large floor mats of *Freycinetia*, in the Museum, than of *Phormium*. There are also very attractive soft mats and baskets made of the sedge *Eleocharis*.

Some of the old accession labels carried a bare description of the article recorded when acquired by the Museum before the turn of the century; such as “flax mat” or “flax kit”, but on recent handling the material was often found to be kiekie, toetoe, nikau or kutakuta. There seems to have been some confusion over the Maori word kutakuta used for two different swamp plants, *Eleocharis sphacelata* and *Scirpus lacustris*. Articles made of *Eleocharis*, but not of the *Scirpus*, have been seen in the Ethnology Department.

Although several authors mentioned the use of *Cortaderia* for thatching and lining houses, for floor mats and kites, only Colenso listed baskets, of which there are two in the Museum collections.

A reddish coloured sedge, *Uncinia rubra*, not recorded in the literature, was

found in a woman's belt in the Museum. Belts made of a reddish sedge were said to be of a *Carex* species.

It is probable that all the plants mentioned by the early authors are to be found in the various museum collections of Maori weaving, plaitwork and cordage. There is little doubt that all these plants, as well as unrecorded ones like *Bulbinella* and *Uncinia*, will be identified in future work on archaeological plant fragments.

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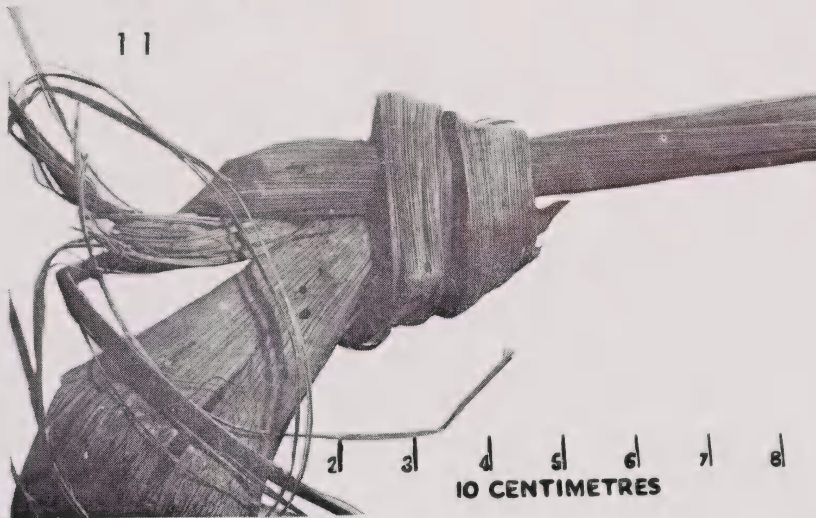
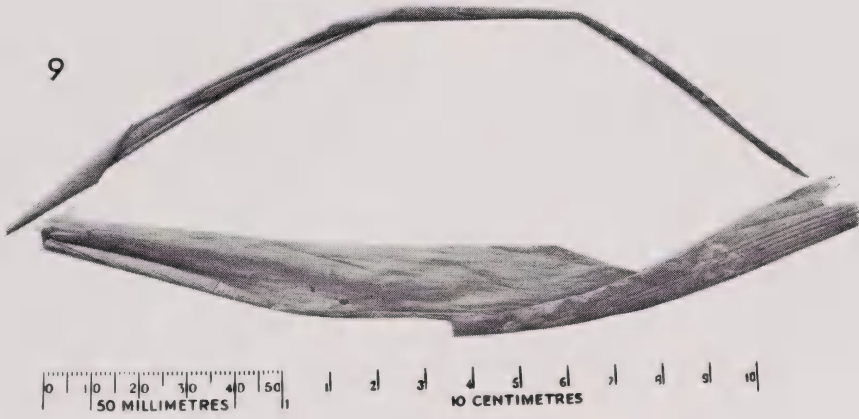
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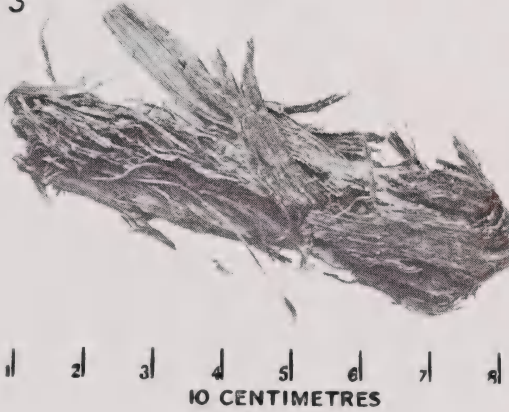


Figs. 9-11. 9. *Bulbinella gibbsii* var. *balanifera*, Fiordland; remains of leaves, Herb. AK 121858. 10. *Phormium* sp., Fiordland; remains of knotted leaf, Herb. AK 122114. 11. *Cordyline* sp., Anawhata; remains of knotted leaf, Eth. 23887.

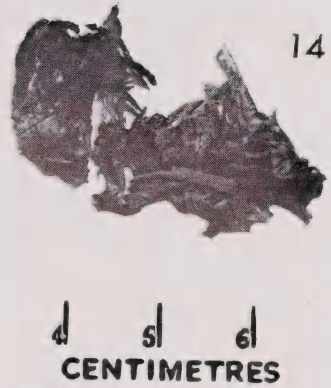
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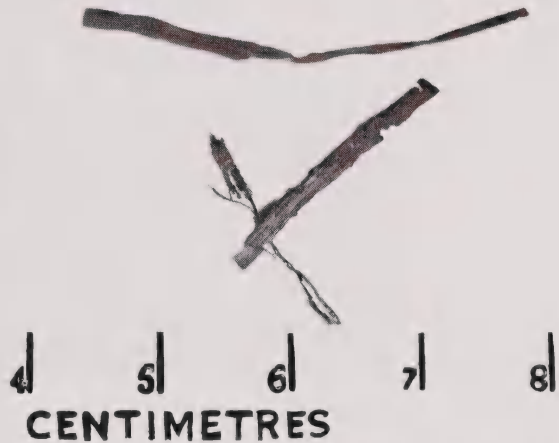
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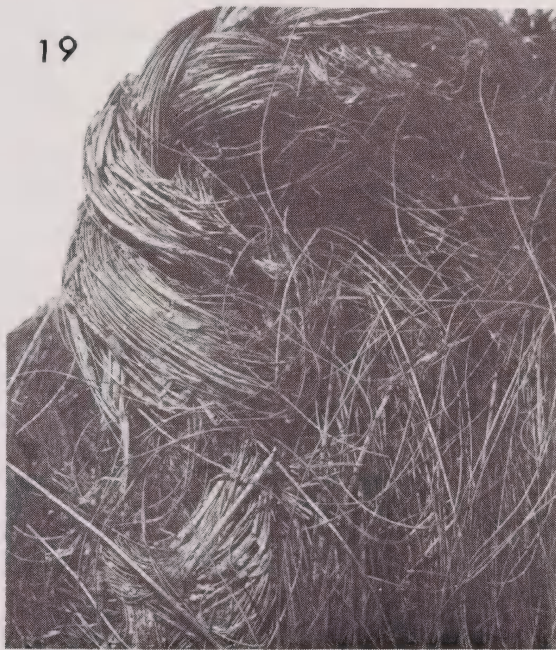
Figs. 12-16. 12. *Astelia* sp., Fiordland; remains of knotted leaf, Herb. AK 121856. 13. *Rhopalostylis sapida*, Fiordland; fragment of leaf, Herb. AK 121810. 14. *Phormium* sp., Fiordland; plaited fragment, Herb. AK 126108. 15. *Dracophyllum* sp., Fiordland; fragments of leaf, Herb. AK 122227. 16. *Dracophyllum* sp., Fiordland; fragments of plait, Herb. AK 126106.



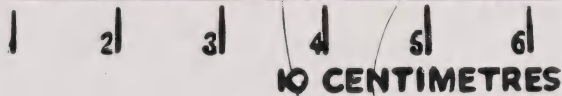
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Figs. 17-19. *Cordyline* sp. 17. Fiordland; plaited; cordage, Herb AK 122422. 18. Fiordland; remains of leaf, Herb. AK 122115. 19. Poor Knights Islands; bundle of fibre, Eth. 24338.



Figs. 20-22. 20. *Phormium* sp., Fiordland; plaited rope, Herb. AK 122060. 21. *Freyinetia banksii*, Lake Taupo; plaited rope, Eth. 35831. 22. *Cocos* sp., Fiordland; twisted rope, Herb. AK 122438.

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Figs. 23-25. *Phormium* sp. 23. Anawhata; fishing net, Eth. 38819. 24. Fiordland; fragment of net, Herb. AK 121859. 25. Anawhata; remains of net, Eth. 23883.



Figs. 26-29. 26. *Freycinetia banksii*, Anawhata; plaited fibre, Eth. 23887.2. 27. *Phormium* sp., Lake Taupo; fragments of woven cloak, Eth. 34802.1. 28. *Phormium* sp., Anawhata; remains of cape (?), Eth. 23889. 29. *Cordyline* sp., Fiordland; fragment of dressed fibre, Herb. AK 126052.



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Figs. 30-32. 30. *Rhopalostylis sapida*, Anawhata; plaited leaf, Eth. 23887. 31. *Freycinetia banksii*, Piha; fragments of twilled plait, Eth. 19775.4. 32. *Phormium* sp., Lake Taupo; plaited bag, Eth. 35829.

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Figs. 33-35. 33. *Cortaderia toetoe*, Piha; remains of plaited basket, Eth. 26448.3. 34. *Astelia* sp., Piha; remains of basket, Eth. 19775.1. 35. *Astelia* sp., Lake Taupo; plaited basket, Eth. 35825.

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Figs. 36-38. 36. *Phormium* sp., Piha; plaited belt, Eth. 19776.2. 37. *Freycinetia banksii*, Piha; plaited belt, Eth. 19776. 38. *Freycinetia banksii*, plaited belt, Eth. 19483.

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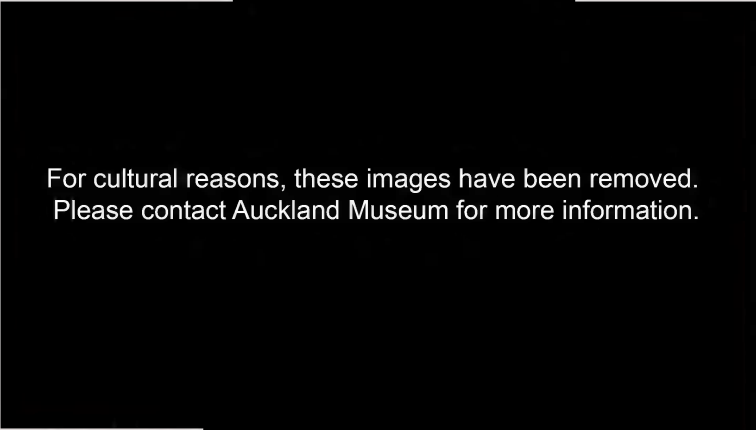
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Figs. 39-41. 39. *Freycinetia banksii*, Lake Taupo; remains of plaited basket, Eth. 35838. 40. *Freycinetia banksii*, Lake Taupo; remains of plaited belt, Eth. 35827. 41. *Cordyline* sp., Lake Taupo; remains of plaited basket, Eth. 35883.



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Figs. 42-44. 42. *Phormium* sp., Lake Taupo; small basket, Eth. 35823. 43. *Freycinetia banksii*, Piha; basket with two handles, Eth. 43127.1. 44. *Phormium* sp., Lake Taupo; woven bag, Eth. 35832.

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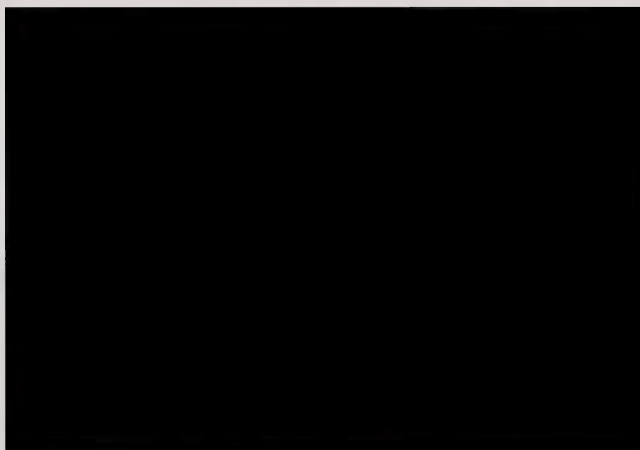
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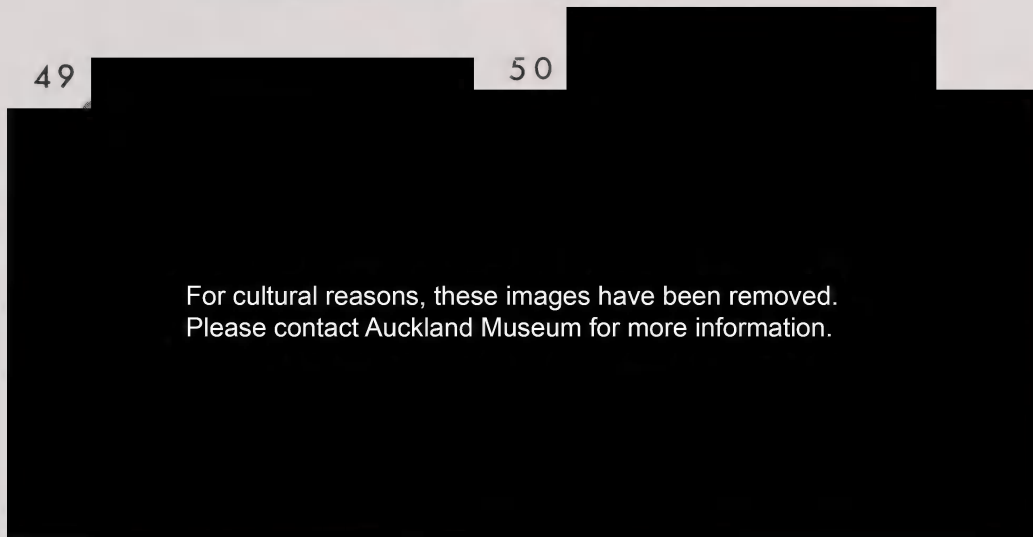
Figs. 45-47. 45. *Phormium* sp., sandal, Eth. 1075. 46. *Cordyline* sp., sandals, Eth. 6180.
47. *Freycinetia banksii*, plaited basket, Eth. 8234.

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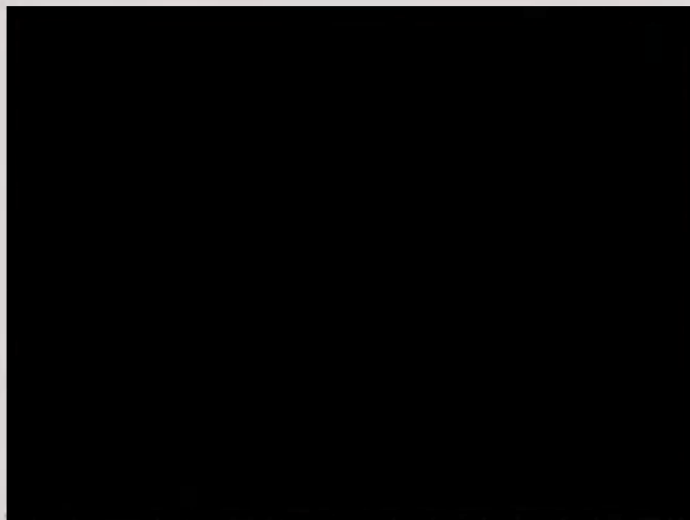


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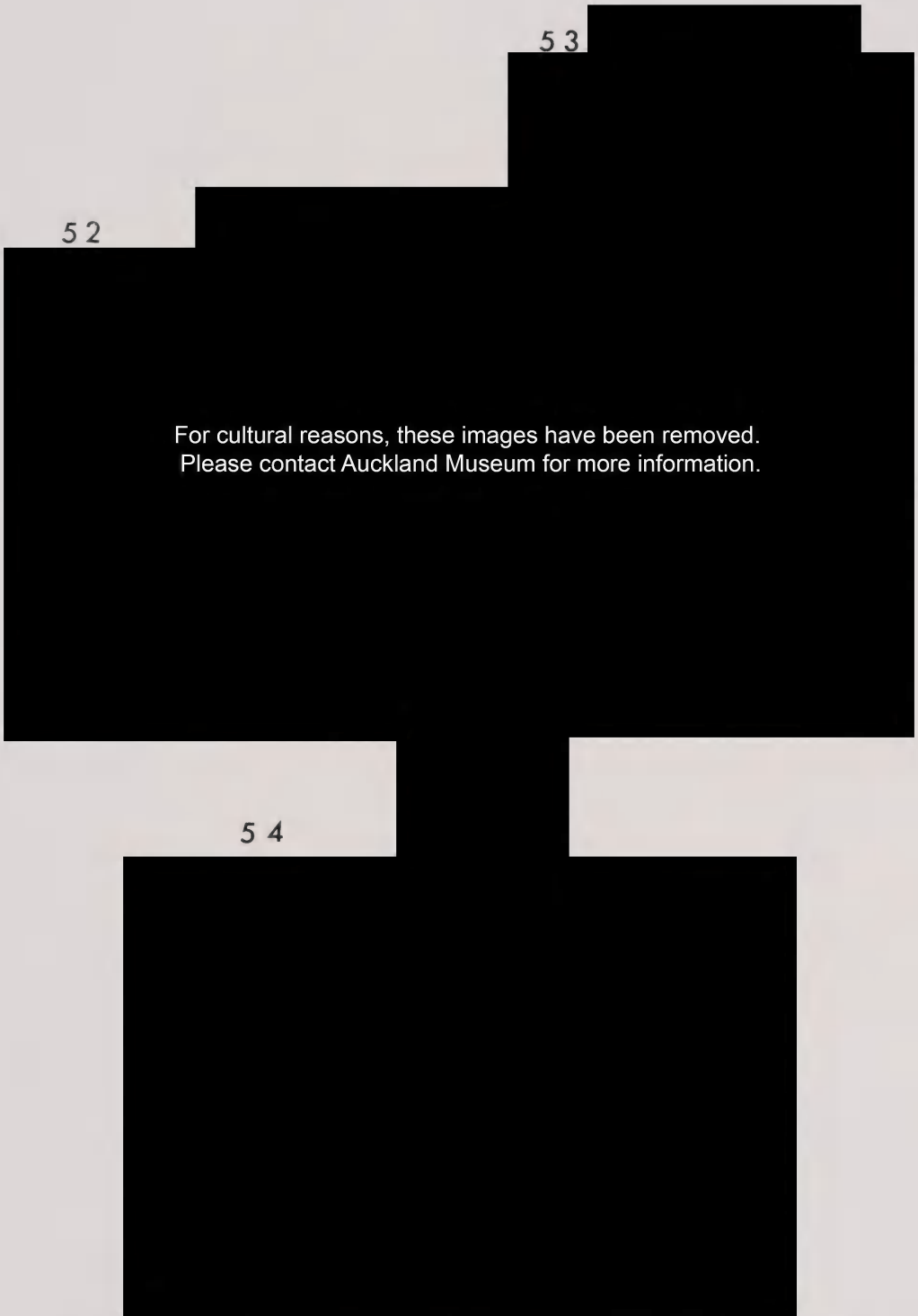
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Figs. 48-51. 48. *Desmoschoenus spiralis*, small plaited basket, Eth. 18811. 49. *Eleocharis sphacelata*, small plaited basket, Eth. 6012. 50. *Cordyline* sp., plaited food basket, Eth. 3867. 51. *Phormium* sp., plaited food basket, Eth. 785.



Figs. 52-54. 52. *Cortaderia* sp., plaited cooking basket, Eth. 31052. 53. *Phormium* sp., plaited cooking basket, Eth. 7678. 54. *Freycinetia banksii*, plaited basket, Eth. 8238.

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Figs. 55-57. 55. *Eleocharis sphacelata*, plaited basket, Eth. 9229. 56. *Rhopalostylis sapiau*, plaited basket, Eth. 6402. 57. *Phormium* sp., small plaited basket, Eth. 740.

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Figs. 58, 59. 58. *Desmoschoenus spiralis* (light colour) with dyed *Phormium*, plaited basket, Eth. 9992. 59. *Freycinetia banksii*, plaited basket, Eth. 660.

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Figs. 63-65. 63. *Phormium* sp., plaited basket, Eth. 6874. 64. *Freycinetia banksii*, plaited basket, Eth. 38128.1. 65. *Freycinetia banksii*, plaited basket, Eth. 5003.



Figs. 66-69. 66. *Typha orientalis*, dried herbarium specimen, Herb. AK 119696. 67. *Bulbinella gibbsii* var. *balanifera*, dried herbarium specimen, Herb. AK 14638. 68. *Freycinetia banksii*, dried herbarium specimen, Herb. AK 126982. 69. *Dracophyllum menziesii*, dried herbarium specimen, Herb. AK 25808.